JEE Main - 2018 (CBT)
Exam Test Date: 16/04/2018

Part - B (Chemistry)

1. For standardizing NaOH solution, which of the following is used as a primary standard ?

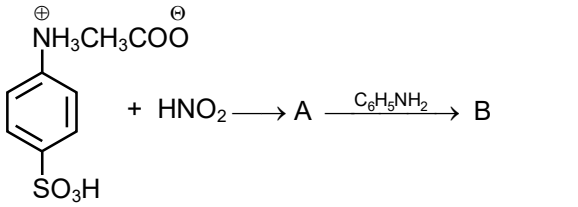
(1) Sodium tetraborate (2) Ferrous Ammonium Sulfate

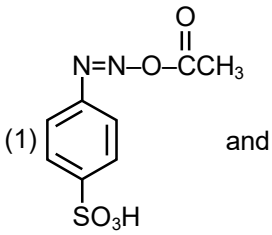
(3) Oxalic acid (4) dil. HCl

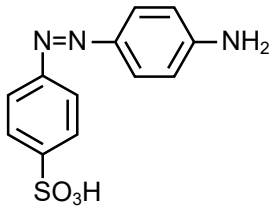
Ans. (3)

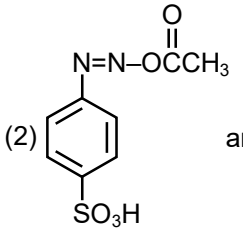
Sol. Oxalic acid is used as a primary standard for NaOH standardizing.

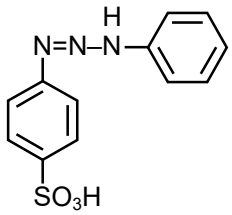
2. Products A and B formed in the following reactions are respectively :

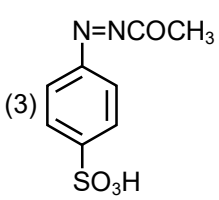


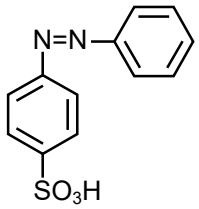
(1) 

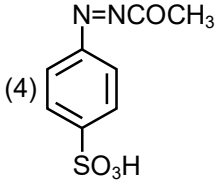
and 

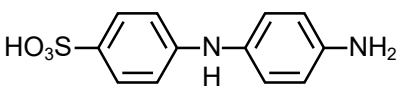
(2) 

and 

(3) 

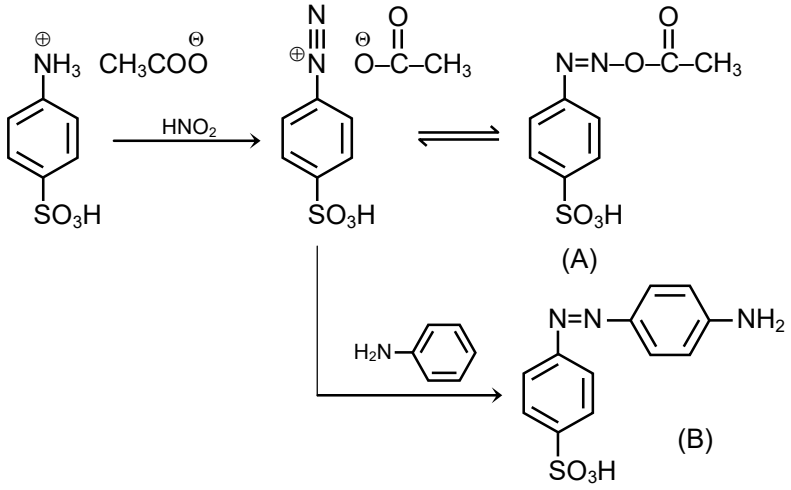
and 

(4) 

and 

Ans. (1)

Sol.



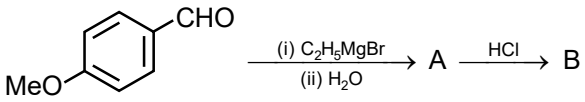
3. When XO_2 is fused with an alkali metal hydroxide in presence of an oxidizing agent such as KNO_3 ; a dark green product is formed which disproportioates in acidic solution to afford a dark purple solution. X is :

(1) Mn (2) Cr (3) V (4) Ti

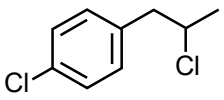
Ans. (1)

Sol. $MnO_2 + KOH \longrightarrow \underset{\text{(dark green)}}{K_2MnO_4} \xrightarrow[\text{solution}]{\text{Acidic}} \underset{\text{(dark purple)}}{KMnO_4}$

4. The major product B formed in the following reaction sequence is :



(1)



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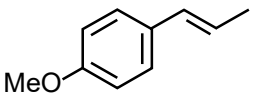

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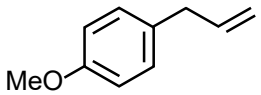
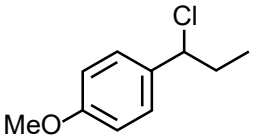
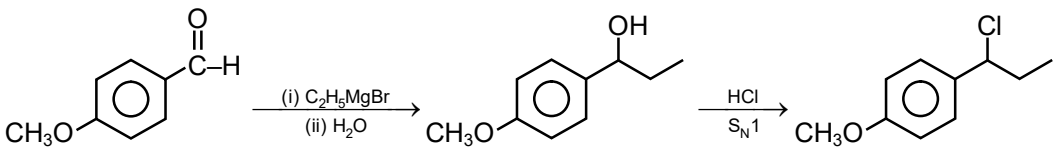


(4)



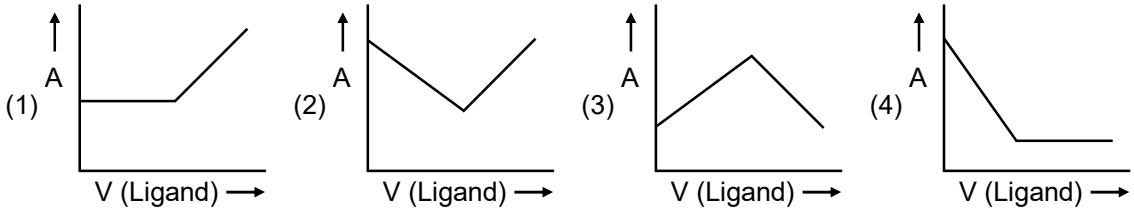
Ans. (4)

Sol.



5. In a complexometric titration of metal ion with ligand

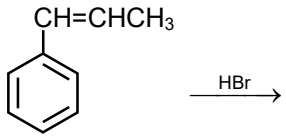
M (Metal ion) + L (Ligand) $\rightarrow$ C (Complex) end point is estimated spectrophotometrically (through light absorption). If 'M' and 'C' do not absorb light and only 'L' absorbs, then the titration plot between absorbed light (A) versus volume of ligand 'L' (V) would look like :

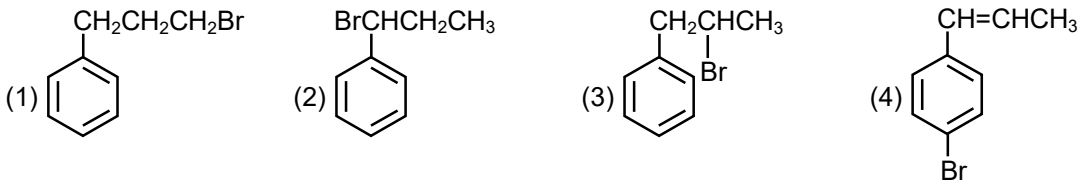


Ans. (1)

Sol. Initially ligand consumed by metal due to formation of complex. So absorbed light (A) remain constant, after complex formation is completed, extra volume of ligand solution increases ligand concentration and also increases absorbed light.

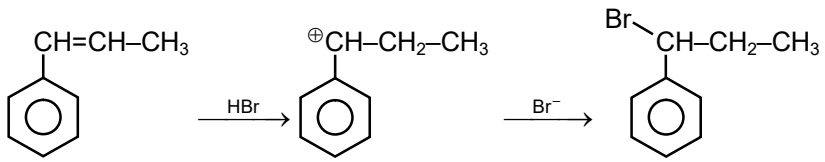
6. The major product of the following reaction is :





Ans. (2)

Sol.



7. Among the following, the **incorrect** statement is :

(1) Cellulose and amylose has 1,4-glycosidic linkage.

(2) Lactose contains β-D-galactose and β-D-glucose.

(3) Maltose and lactose has 1,4-glycosidic linkage.

(4) Sucrose and amylose has 1,2-glycosidic linkage.

Ans. (4)

Sol. In amylose 1,4-glycosidic linkage is present.

8. In the extraction of copper from its sulphide ore, metal is finally obtained by the oxidation of cuprous sulphide with :

(1) SO_2 (2) Fe_2O_3 (3) Cu_2O (4) CO

Ans. (3)

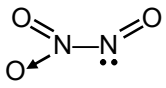
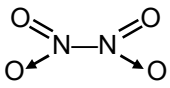
Sol. $Cu_2S + 2Cu_2O \longrightarrow 6Cu + SO_2$

9. Among the oxides of nitrogen :

N_2O_3, N_2O_4 and N_2O_5 ; the molecule(s) having nitrogen-nitrogen bond is/are :

(1) N_2O_3 and N_2O_4 (2) N_2O_4 and N_2O_5 (3) N_2O_3 and N_2O_5 (4) Only N_2O_5

Ans. (1)

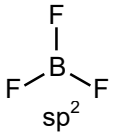
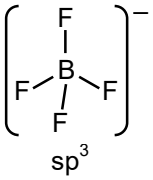
Sol. N_2O_3  N_2O_4 

10. Which of the following conversions involves change in both shape and hybridisation ?

(1) $H_2O \rightarrow H_3O^+$ (2) $BF_3 \rightarrow BF_4^-$ (3) $CH_4 \rightarrow C_2H_6$ (4) $NH_3 \rightarrow NH_4^+$

Ans. (2)

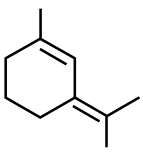
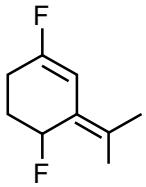
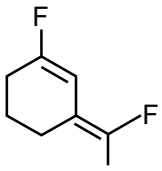
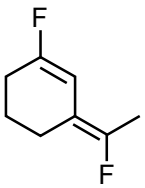
Sol. $BF_3 \longrightarrow BF_4^-$

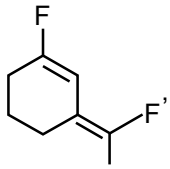
sp^2 sp^3

Triangle planar Tetrahedral

11. The most polar compound among the following is :

(1)  (2)  (3)  (4) 

Ans. (3)

Sol. In  , the bond dipole vector of C–F bond is not subtractive.

12. In Wilkinson's catalyst, the hybridization of central metal ion and its shape are respectively :

(1) sp^3d, trigonal bipyramidal (2) d^2sp^3, octahedral

(3) dsp^2, square planar (4) sp^3, tetrahedral

Ans. (3)

Sol. Wilkinson catalyst

$[RhCl(PPh_3)_3]$

13. At 320 K, a gas A_2 is 20 % dissociated to A(g). The standard free energy change at 320 K and 1 atm in J mol^{-1} is approximately : ($R = 8.314\ JK^{-1}\ mol^{-1}$; ln 2 = 0.693 ; ln 3 = 1.098)

(1) 1844 (2) 2068 (3) 4281 (4) 4763

Ans. (3)

Sol. $A_2(g) \rightleftharpoons 2A(g)$

1 0

$1 - 1\times\frac{20}{100}$ $2\times\frac{20}{100}$

0.8 0.4

$K_p = \frac{(p_A)^2}{(p_{A_2})} = \frac{0.4\times0.4}{0.8} = 0.2$

$\Delta G^\circ = -2.303 \times 8.314 \times 320 \log_{10} 0.2 = 4281$ J/mole

14. Which of the following complexes will show geometrical isomerism ?

(1) Potassium tris(oxalato)chromate(III)

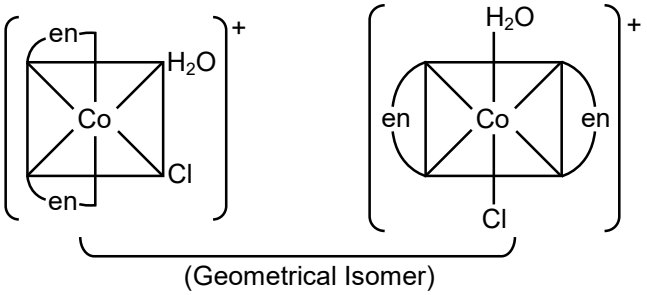
(2) Pentaaquachlorochromium(III)chloride

(3) Aquachlorobis(ethylenediamine)cobalt(II) chloride

(4) Potassium amminetrichloroplatinate(II)

Ans. (3)

Sol. $[Co(H_2O)Cl(en)_2]Cl$



(Geometrical Isomer)

15. Which of the following statements is **false** ?

(1) Splitting of spectral lines in electrical field is called Stark effect.

(2) Frequency of emitted radiation from a black body goes from a lower wavelength of higher wavelength as the temperature increases.

(3) Photon has momentum as well as wavelength.

(4) Rydberg constant has unit of energy.

Ans. (2) and (4) [both are false]

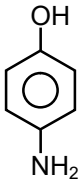
Sol. When temperature is increased, black body emit high energy radiation, from higher wavelength to lower wavelength.

Rydberg constant has unit length^{-1} (i.e. cm^{-1})

16. When 9.65 ampere current was passed for 1.0 hour into nitrobenzene in acidic medium, the amount of p-aminophenol produced is :

(1) 109.0 g (2) 98.1 g (3) 9.81 g (4) 10.9 g

Ans. (3)

Sol. $C_6H_5NO_2 \longrightarrow$ 

$4e^- + 4H^+ + C_6H_5NO_2 \longrightarrow \underset{\text{M.W.} = 109\text{ g}}{C_6H_4(OH)(NH_2)} + H_2O$

(v.f.) = 4 $\quad W = ZIt = \frac{E}{F} \times I \times t \quad \left(E = \frac{M}{4}\right)$

$$W = \frac{109 \times 9.65 \times 60 \times 60}{4 \times 96500}$$

W = 9.81 g

17. For which of the following processes, ΔS is negative ?

(1) C(diamond) $\rightarrow$ C(graphite) (2) N_2(g, 1 atm) $\rightarrow$ N_2(g, 5 atm)

(3) N_2(g, 273 K) $\rightarrow$ N_2(g, 300 K) (4) H_2(g) $\rightarrow$ 2H(g)

Ans. (2)

Sol. N_2 (g, 1 atm) $\longrightarrow$ N_2 (g, 5 atm)

$\Delta S = \left(nC_p \ln\frac{T_2}{T_1}\right) + nR \ln\frac{V_2}{V_1}$ for isothermal process $T_1 = T_2$ and $\frac{V_2}{V_1} = \frac{P_1}{P_2}$

$= 0 + nR \ln\frac{P_1}{P_2} = nR \ln\frac{1}{5}$

$\Delta S < 0$

18. An unknown chlorohydrocarbon has 3.55 % of chlorine. If each molecule of the hydrocarbon has one chlorine atom only ; chlorine atoms present in 1 g of chlorohydrocarbon are :
(Atomic wt. of Cl = 35.5 u ; Avogadro constant = 6.023×10^{23} mol^{-1})
(1) 6.023×10^{9} (2) 6.023×10^{23} (3) 6.023×10^{21} (4) 6.023×10^{20}

Ans. (4)

Sol. C_xH_yCl

% Cl = 3.55

Weight of Cl = $1 \times \frac{3.55}{100}$

$n_{Cl^-} = \frac{1 \times 3.55}{100 \times 35.5}$

No of Cl^- ion = $\frac{1 \times 3.55}{100 \times 35.5} \times 6.023 \times 10^{23}$

$= 6.023 \times 10^{20}$

19. The **incorrect** statement is :
(1) Cu^{2+} ion gives chocolate coloured precipitate with potassium ferrocyanide solution.
(2) Cu^{2+} and Ni^{2+} ions give black precipitate with H_2S in presence of HCl solution.
(3) Ferric ion gives blood red colour with potassium thiocyanate.
(4) Cu^{2+} salts give red coloured borax bead test in reducing flame.

Ans. (2)

Sol. Due to common ion effect, sufficient S^{2-} concentration not produce and not formed ppt of NiS.

20. The mass of a non-volatile, non-electrolyte solute (molar mass = 50 g mol^{-1}) needed to be dissolved in 114 g octane to reduce its vapour pressure to 75 %, is :
(1) 37.5 g (2) 75 g (3) 150 g (4) 50 g

Ans. (Bonus)

Sol. $\frac{P^o - P_s}{P_s} = \frac{n}{N}$

$\frac{100P - 75P}{75P} = \frac{\frac{W}{50}}{1}$

$\frac{25}{75} = \frac{W}{50}$

$W = \frac{50}{3}$ g

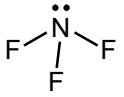
21. The **incorrect** geometry is represented by :

(1) NF_3 – trigonal planar (2) BF_3 – trigonal planar

(3) AsF_5 – trigonal bipyramidal (4) H_2O – bent

Ans. (1)

Sol. NF_3



sp^3

Trigonal pyramidal

22. Assuming ideal gas behaviour, the ratio of density of ammonia to that of hydrogen chlroide at same temperature and pressure is : (Atomic wt. of Cl 35.5 u)

(1) 1.46 (2) 1.64 (3) 0.46 (4) 0.64

Ans. (3)

Sol. $d = \frac{P(M.w.)}{RT}$

$$\frac{d_{NH_3}}{d_{HCl}} = \frac{(M.w.)_{NH_3}}{(M.w.)_{HCl}} = \frac{17}{36.5} = 0.46$$

23. The correct match between items of List-I and List-II is :

	List-I		List-II
(A)	Phenelzine	(P)	Pyrimidine
(B)	Chloroxylenol	(Q)	Furan
(C)	Uracil	(R)	Hydrazine
(D)	Ranitidine	(S)	Phenol

(1) (A)-(S), (B)-(R), (C)-(Q), (D)-(P) (2) (A)-(R), (B)-(S), (C)-(P), (D)-(Q)

(3) (A)-(R), (B)-(S), (C)-(Q), (D)-(P) (4) (A)-(S), (B)-(R), (C)-(P), (D)-(Q)

Ans. (2)

Sol. $\rightarrow$ Phenelzine contains hydrazine

$\rightarrow$ Chloroxylenol contains phenol

$\rightarrow$ Uracil is the pyrimidine base

$\rightarrow$ Ranitidine contains furan ring

24. The gas phase reaction $2NO_2(g) \rightarrow N_2O_4(g)$ is an exothermic reaction. The decomposition of N_2O_4, in equilibrium mixture of $NO_2(g)$ and $N_2O_4(g)$, can be increased by :

(1) addition of an inert gas at constant pressure.

(2) lowering the temperature

(3) increasing the pressure

(4) addition of an inert gas at constant volume.

Ans. (1)

Sol. $2NO_2(g) \longrightarrow N_2O_4(g)$ $\Delta H = (-)$

By addition of an inert gas at constant pressure, volume increases, so reaction moving in backward direction and decomposition of N_2O_4 increases.

25. Which one of the following is not a property of physical adsorption ?

(1) Higher the pressure, more the adsorption

(2) Greater the surface area, more the adsorption

(3) Lower the temperature, more the adsorption

(4) Unilayer adsorption occurs

Ans. (4)

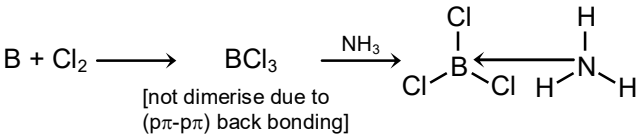
Sol. Physical adsorption is multilayer adsorption.

26. A group 13 element 'X' reacts with chlorine gas to produce a compound XCl_3. XCl_3 is electron deficient and easily reacts with NH_3 to form $Cl_3X \leftarrow NH_3$ adduct; however, XCl_3 does not dimerize. X is :

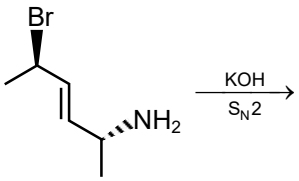
(1) B (2) Al (3) In (4) Ga

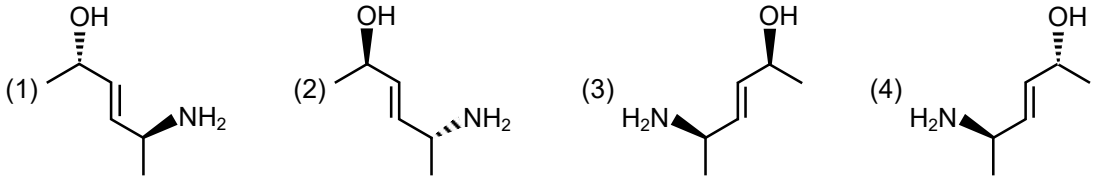
Ans. (1)

Sol. BCl_3



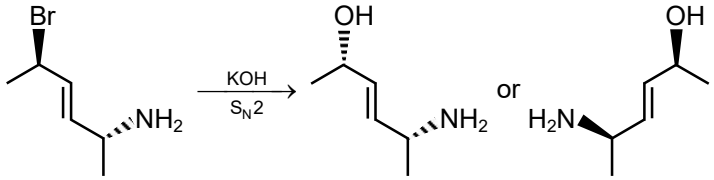
27. The major product of the following reaction is :





Ans. (3)

Sol.



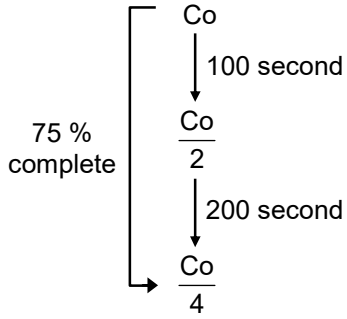
Inversion takes place at the carbon containing bromine atom.

28. If 50 % of a reaction occurs in 100 second and 75 % of the reaction occurs in 200 second, the order of this reaction is :

(1) 2 (2) 3 (3) Zero (4) 1

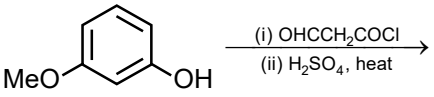
Ans. (4)

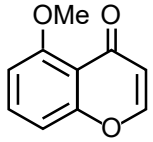
Sol.

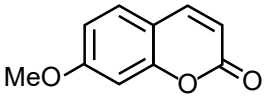


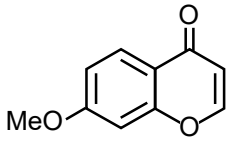
First order reaction as half life is constant.

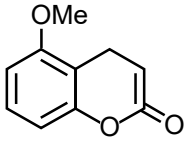
29. The major product of the following reaction is :



(1) 

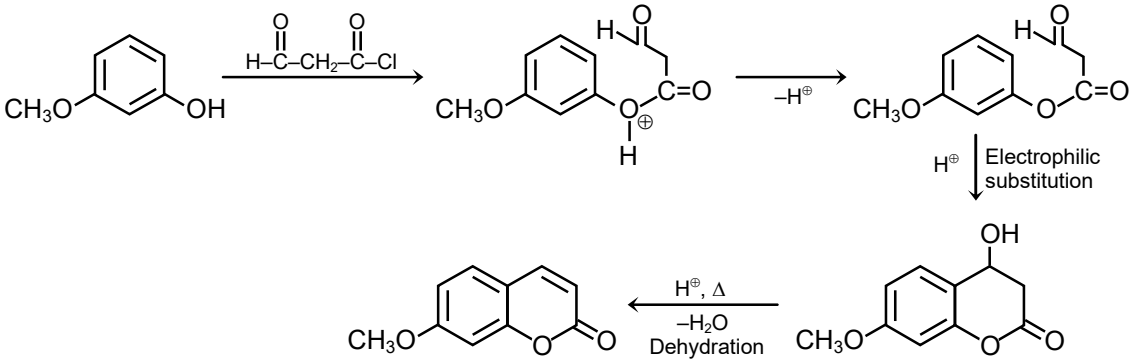
(2) 

(3) 

(4) 

Ans. (2)

Sol.

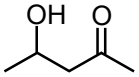


30. Which of the following compounds will most readily be dehydrated to give alkene under acidic condition?

(1) 4-Hydroxypentan-2-one (2) 3-Hydroxypentan-2-one

(3) 1-Pentanol (4) 2-Hydroxycyclopentanone

Ans. (1)

Sol. 

will most readily be dehydrated to give conjugated alkene.